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CASE REPORT

Delayed presentation of herniated ileal perforation after blunt abdominal injury

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Summary Blunt abdominal injuries are not uncommon; however, ileal perforation caused by blunt trauma, especially when associated with an inguinal hernia, is a very rare event, and a difficult diagnosis. We present the case of a 63-year-old male who had sustained a blunt abdominal injury on his left inguinal hernia in a bicycle versus motorcycle accident. Computed tomography (CT) scans on arrival at hospital showed the left inguinal hernia with partial protrusion of the small intestine, without categorical inflammatory changes of the mesenteric tissue or intraperitoneal fluid. During observation, he sustained intermittent lower abdominal pain. About 8 hours later, hypotension and fever ensued. The repeated CT scans showed adjacent bowel edema with free air, and a hernia sac, in the left lower quadrant of the abdomen. Emergency laparotomy revealed ileal perforation. Segmental resection with end-to-end anastomosis was performed. The patient made an uneventful recovery and was discharged 2 weeks later. Although the CT scan has become the gold standard in evaluating abdominal trauma, delayed perforation of the intestine with blunt injuries may escape early detection. Serial physical examinations with a high index of suspicion are mandatory in susceptible patients to avoid time-related complications. The imaging findings from a single examination should not be depended upon solely.

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1. Introduction

Inguinal hernias are very common in elderly male adults, but blunt contusion to the hernia causing intestinal perforation is rare.[1–8] The computed tomographic (CT) scan has become an important diagnostic tool in evaluating abdominal injuries[9]; however, physicians can over depend on modern technology for diagnosis without noting the essential limitations in that scans cannot provide information of real-time changes of a patient's status. Therefore, it is essential to combine continuous clinical evaluations and modern technology to make a correct diagnosis. We present here a patient with ileal perforation after blunt abdominal injury. The first CT scans did not show any specific findings above a left inguinal hernia. However, the intermittent but persistent abdominal pain with obscure peritoneal signs and hypotension, initiated serial work-up including a repeated CT scan that showed intestinal perforation with free air, which was later confirmed in an emergency operation. However, it is emphasized that surgical exploration could have been performed more promptly if more attention had been paid to clinical findings for diagnosis, rather than to merely image changes.

2. Case report

A 63-year-old male with a medical history of known left inguinal hernia, chronic alcoholism and chronic hepatitis sustained direct contusion from a bicycle seat to the left inguinal area while in a collision accident with a motorcycle. About 1 hour later, he presented to our emergency department (ED), and was found to have intense pain in the left hypogastrium, associated with intense sweating. On arrival, he showed the following vital signs: heart rate 98 beats/minute; respiratory rate 16 breaths/minute; blood pressure 116/82 mmHg, and temperature 35.5°C. On physical examination, there was a reducible left inguinal hernia, with no ecchymosis on the abdominal wall. Bowel sounds were normoactive, but tenderness on the lower abdomen was noted. A plain abdominal (X-ray) film revealed no free air. An initial Focus Assessment Sonography for Trauma (FAST) was carried out and no fluid accumulation was found. His laboratory data showed: white blood cell count 9300 per mm^3; hematocrit 40.8%; serum creatinine 1.16 mg/dL; blood urea nitrogen 16 mg/dL; amylase 73 IU/L; lipase 49 IU/L; aspartate aminotransferase 50 IU/L, and alanine aminotransferase 61 IU/L.

Abdominal computed tomography (CT) was performed soon after arrival and showed no dilatation of the small bowel, no intraperitoneal fluid, and a left inguinal hernia, with partial protrusion of the ileum inside the hernia sac without evidence of free air or fluid (Fig. 1). Considering that the patient was showing persisting intense abdominal pain, he was observed at the ED ward. Eight hours later, the patient developed hypotension, fever and persistent abdominal pain. Reexamination of the abdomen showed muscle guarding, and absence of bowel sounds. Hemodynamic data were stable after fluid infusion, and the repeated abdominal CT showed free air in the hernia sac and peritoneal cavity, associated with bowel edema and fluid accumulation (Fig. 2). An emergency laparotomy was performed, which revealed partial protrusion of the ileum into the hernia sac and three perforations with turbid fluid spreading into the lower intraperitoneal area. The intestine was resected with end-to-end anastomosis; a peritoneal cavity lavage was performed. The inguinal hernia was also repaired intraperitoneally without mesh. The postoperative course was unremarkable. The patient was discharged 2 weeks later. The outpatient follow-up 2 weeks later showed that he had gradually resumed his regular activities.

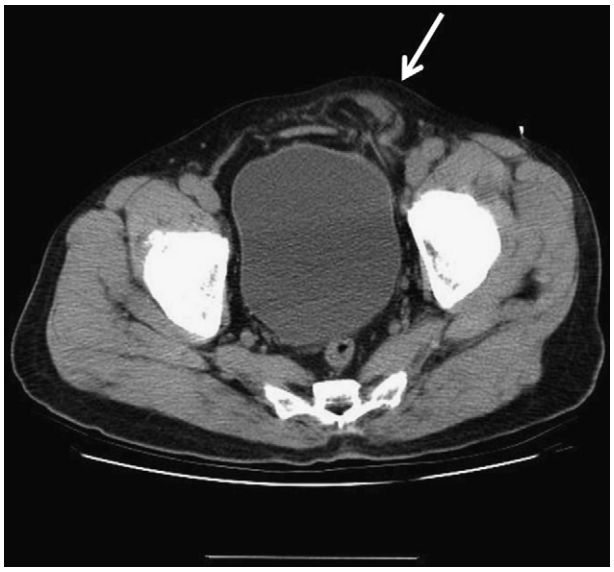

Figure 1 Abdominal computed tomography scan at the time of hospital admission. Only the left inguinal hernia was found (white arrow); there was neither fluid accumulation nor any signs of small intestinal injury.

3. Discussion

Abdominal blunt trauma is a common vehicle-related injury, but traumatic small intestinal perforation inside an inguinal hernia caused by direct trauma is rare. However, hernia is a risk factor of intestinal injury after direct blunt contusion because of the relative lack of protection by the belly, and delayed perforations may occur without being noticed at the first examination.

The most frequent abdominal wall hernia is inguinal hernia, which accounts for up to 75% of hernias occurring in 27% of men and 3% of women during their lifetime. Of the complications of inguinal hernia, strangulation and incarceration are the most commonly encountered, which lead to obstruction and perforation.[1] There have been rare reports of intra-hernia small bowel perforation following blunt abdominal trauma.[1–8,10] In patients with a preexisting intestine falling into the inguinal hernia, in particular, perforation of the intestine can follow blunt trauma to the abdomen or inguinal region even in low-speed vehicle crashes.

The mechanisms of abdominal blunt trauma, that cause intestinal perforation in the hernia sac, have received various explanations. Reynolds asserted that direct trauma to an inguinal hernia can produce enough pressure to cause

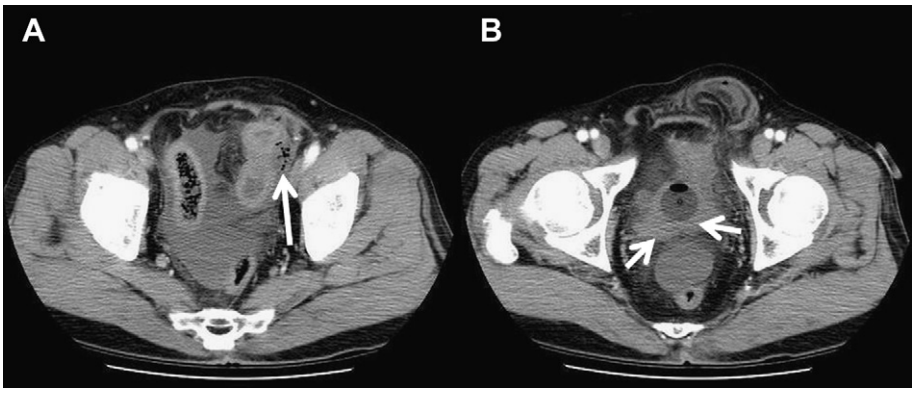

Figure 2 Abdominal computed tomography scan 8 hours later. (A) Adjacent intra-abdominal bowel edema and free air in the left lower quadrant (white arrow). (B) Left inguinal hernia with free air (short white arrow). Ascites was found to have accumulated around the cul-de-sac (white arrow).

perforation of the intestinal walls.[1,3–8] A study by O'Leary and MacGregor showed rapid elevation of intra-abdominal pressure as high as 300 mmHg, exceeding the 150 mmHg to 260 mmHg needed to perforate an intestinal loop in experimental models[2]; this could be the cause in our patient. Another theory is that sheering forces occur between the bowel in the hernia and its fixation point on the mesentery, causing the bowel wall to stretch and tear.[11] We believe that the underlying mechanism in this case was the elevation of intra-abdominal pressure, which probably led to increased intraluminal pressure in the segment of the intestine adjacent to the hernia, the increased pressure gradient causing the intestinal loop to blow out over the aperture.

The diagnosis of small bowel perforation can be very challenging. It is based on the history, mechanism of injury, and serial physical examination. A CT scan and ultrasound can be performed, but the predictive ultrasound is of positive value in the diagnosis of blunt small bowel injury (SBI) in only 38% of cases and the false-negative rate for the CT scan in diagnosing perforated SBI is about 13%. Thus, a CT scan and ultrasound cannot be relied upon to rule out perforated SBI.[12] In our case, the initial CT scan did not show any obvious finding, and therefore a delayed or missed diagnosis would have been made if it had been taken as definitive.

Owing to the potential delay of complications in presentation, all patients who have a pre-existing inguinal hernia with blunt abdominal injury should be observed for at least 24 hours even though the first examination might appear normal. Hernia is a risk factor to cause small intestinal perforation, which may not be caused solely by direct contusion. Thus our patient stresses the importance of a careful and serial physical examination rather than relying merely on the images. When the patient develops signs of peritonitis, surgical intervention is mandatory to avoid time-related morbidity and mortality.

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